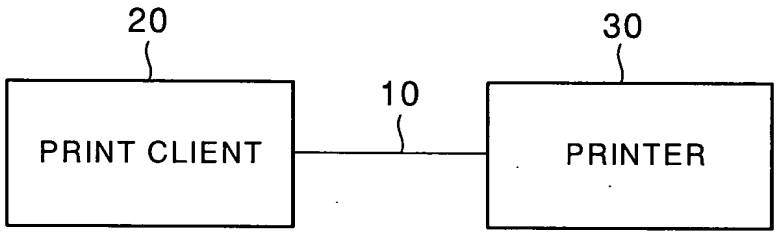

FIG. 1

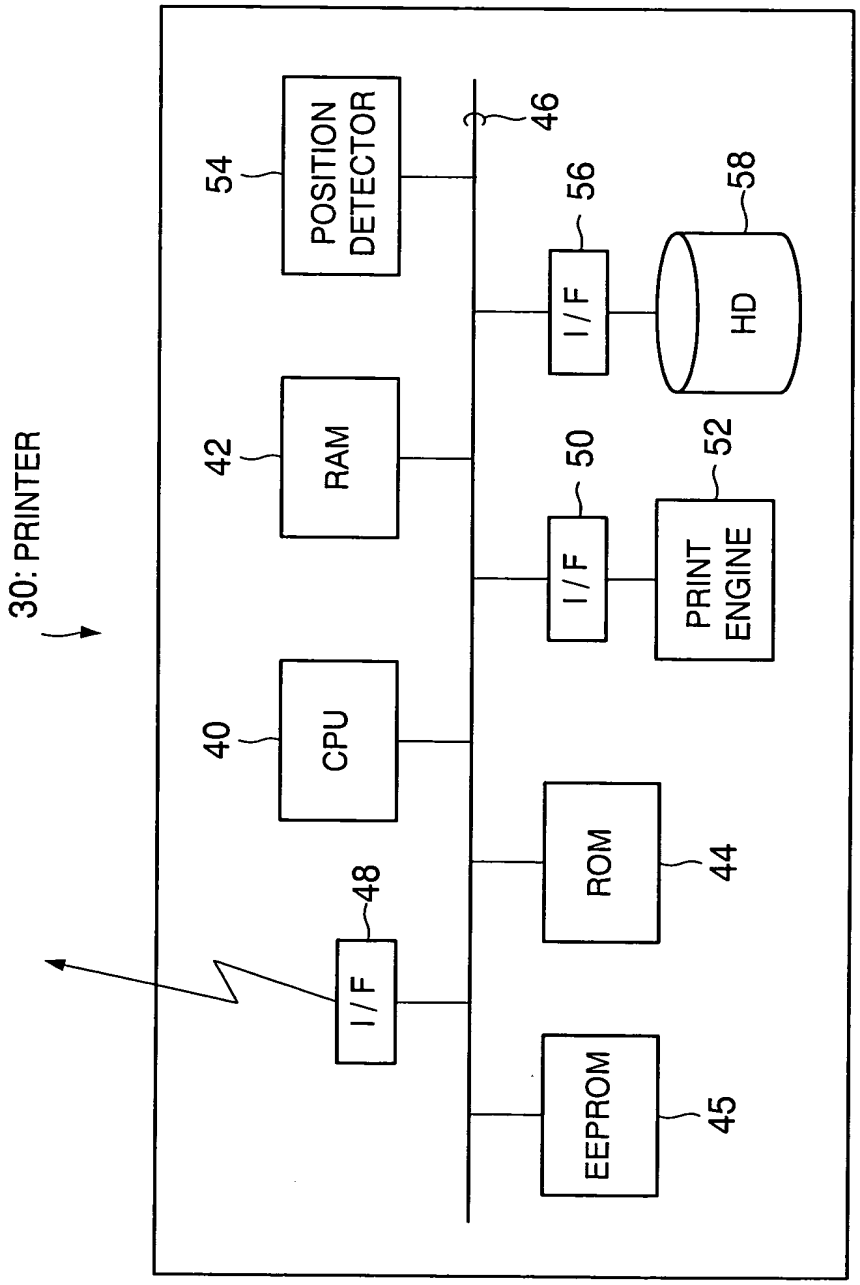
30: PRINTER
40
CPU
42
RAM
44
ROM
45
EEPROM
46
48
I / F
50
I / F
52
PRINT ENGINE
54
POSITION DETECTOR
56
I / F
58
HD

FIG. 2

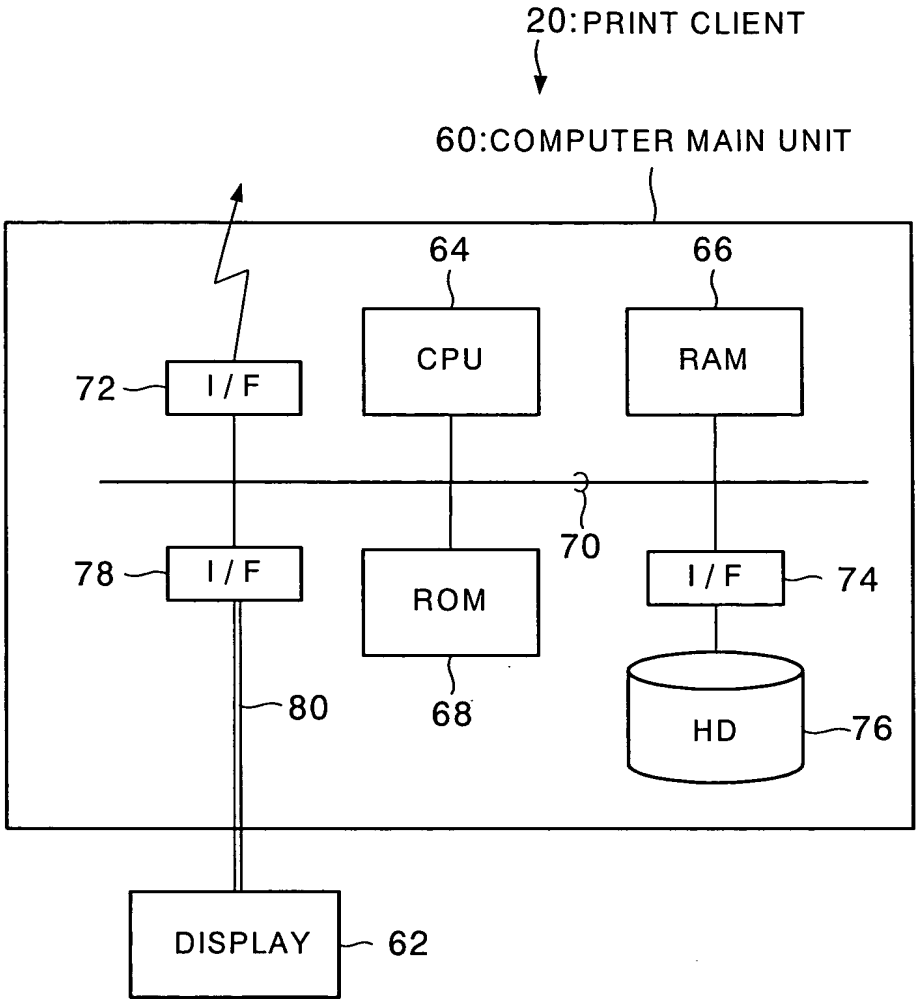
20:PRINT CLIENT
60:COMPUTER MAIN UNIT
64
66
CPU
RAM
72
I/F
70
78
I/F
ROM
I/F
74
80
68
HD
76
DISPLAY
62

FIG. 3

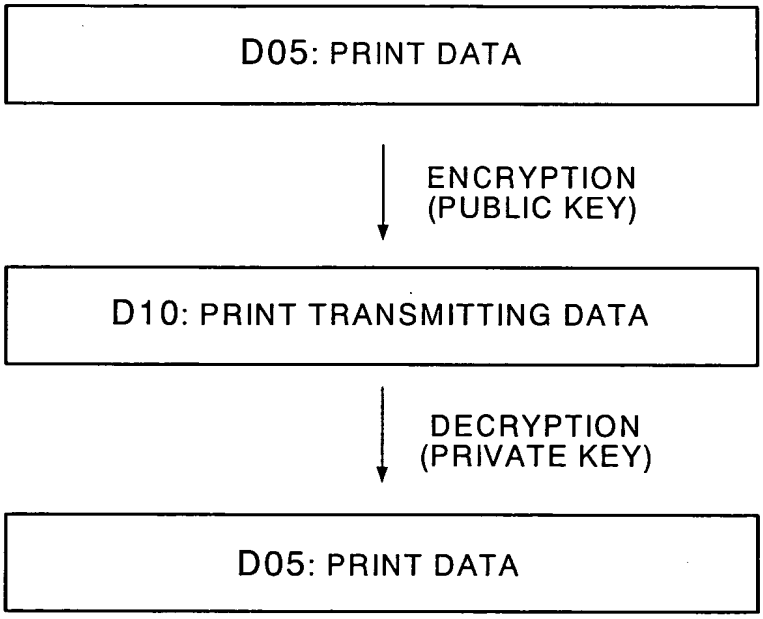
D05: PRINT DATA
ENCRYPTION
(PUBLIC KEY)
D10: PRINT TRANSMITTING DATA
DECRYPTION
(PRIVATE KEY)
D05: PRINT DATA

FIG. 4

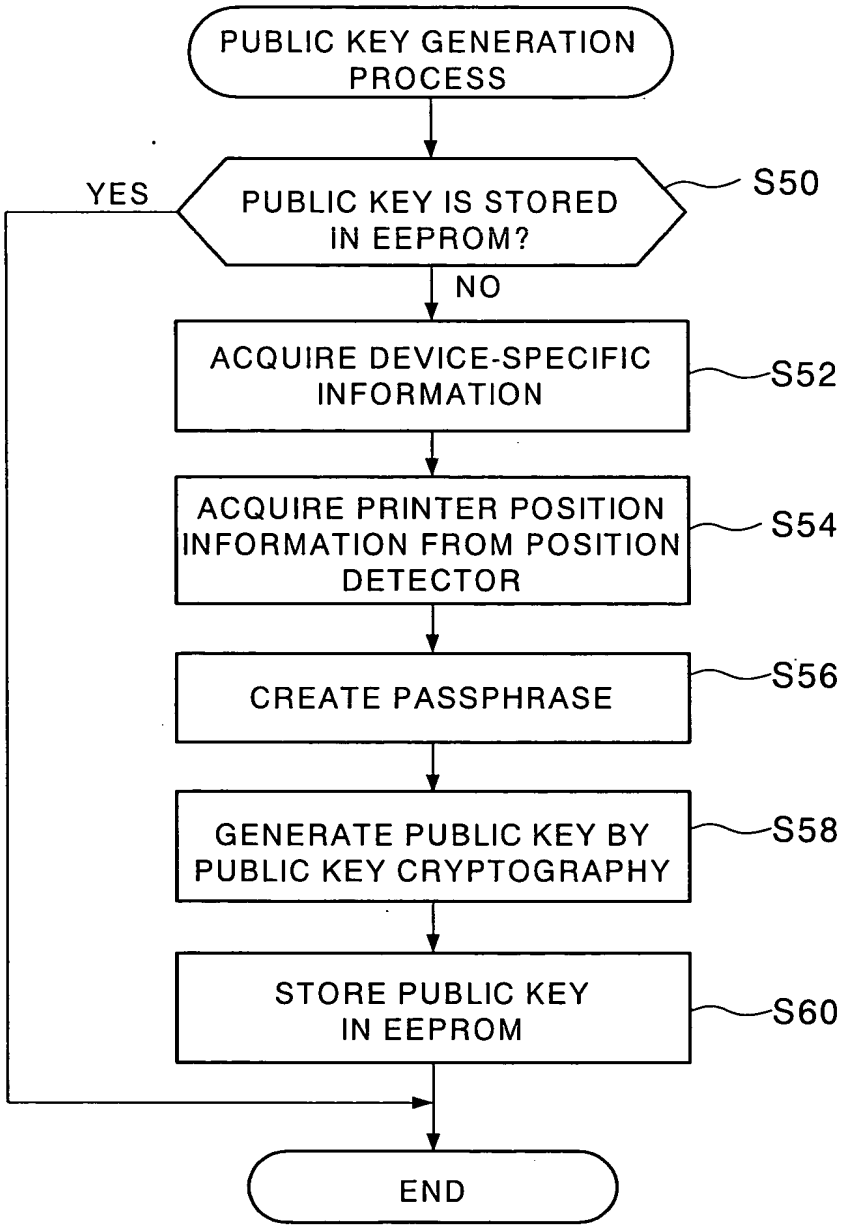
PUBLIC KEY GENERATION PROCESS
PUBLIC KEY IS STORED IN EEPROM?
S50
YES
NO
ACQUIRE DEVICE-SPECIFIC INFORMATION
S52
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S54
CREATE PASSPHRASE
S56
GENERATE PUBLIC KEY BY PUBLIC KEY CRYPTOGRAPHY
S58
STORE PUBLIC KEY IN EEPROM
S60
END

FIG. 5

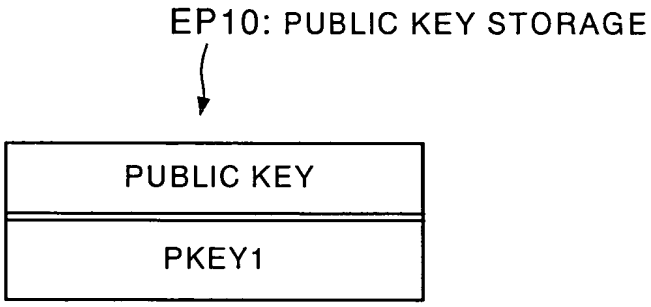

FIG. 6

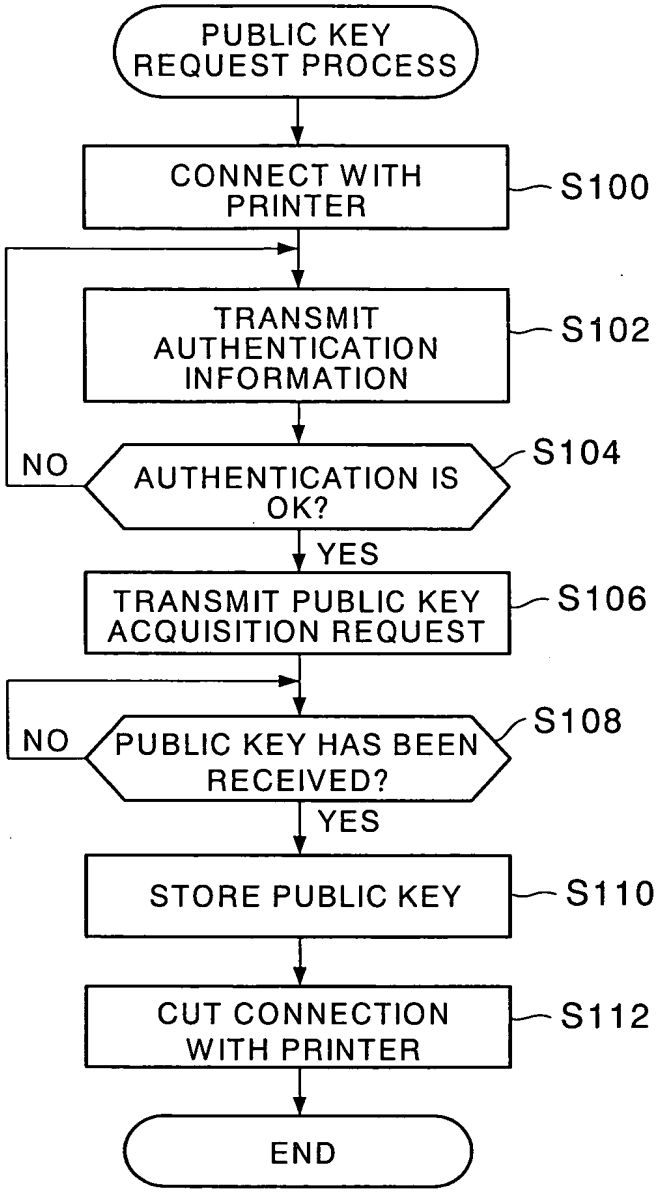
PUBLIC KEY REQUEST PROCESS
CONNECT WITH PRINTER
S100
TRANSMIT AUTHENTICATION INFORMATION
S102
NO
AUTHENTICATION IS OK?
S104
YES
TRANSMIT PUBLIC KEY ACQUISITION REQUEST
S106
NO
PUBLIC KEY HAS BEEN RECEIVED?
S108
YES
STORE PUBLIC KEY
S110
CUT CONNECTION WITH PRINTER
S112
END

FIG. 7

TB10: PUBLIC KEY TABLE

TD10	TD11
PRINTER	PUBLIC KEY
PRINTER-ID1	PKEY1
PRINTER-ID2	PKEY2
⋮	⋮

FIG. 8

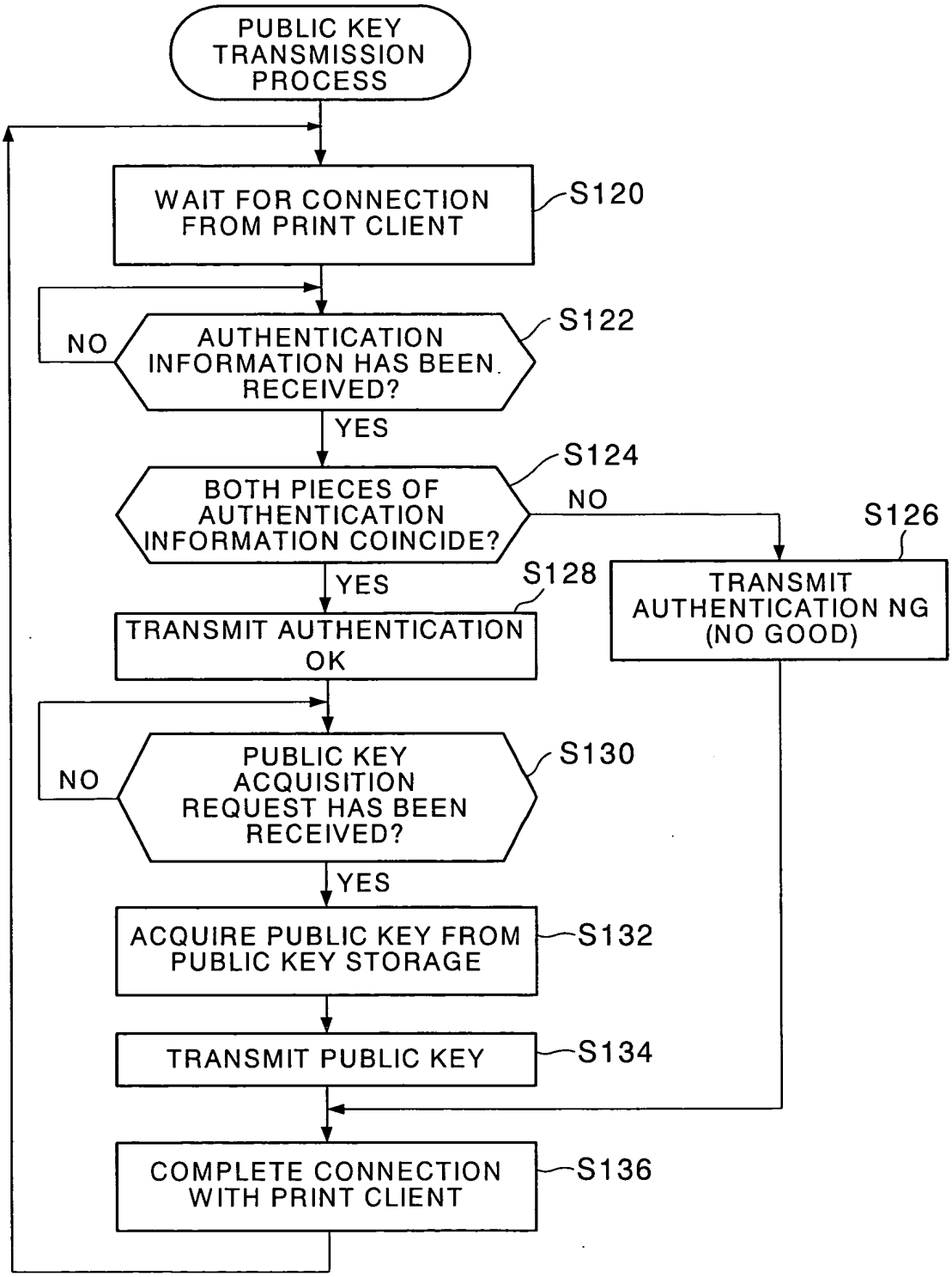
PUBLIC KEY TRANSMISSION PROCESS
WAIT FOR CONNECTION FROM PRINT CLIENT
S120
NO
AUTHENTICATION INFORMATION HAS BEEN RECEIVED?
S122
YES
BOTH PIECES OF AUTHENTICATION INFORMATION COINCIDE?
S124
NO
S126
TRANSMIT AUTHENTICATION NG (NO GOOD)
YES
S128
TRANSMIT AUTHENTICATION OK
NO
PUBLIC KEY ACQUISITION REQUEST HAS BEEN RECEIVED?
S130
YES
ACQUIRE PUBLIC KEY FROM PUBLIC KEY STORAGE
S132
TRANSMIT PUBLIC KEY
S134
COMPLETE CONNECTION WITH PRINT CLIENT
S136

FIG. 9

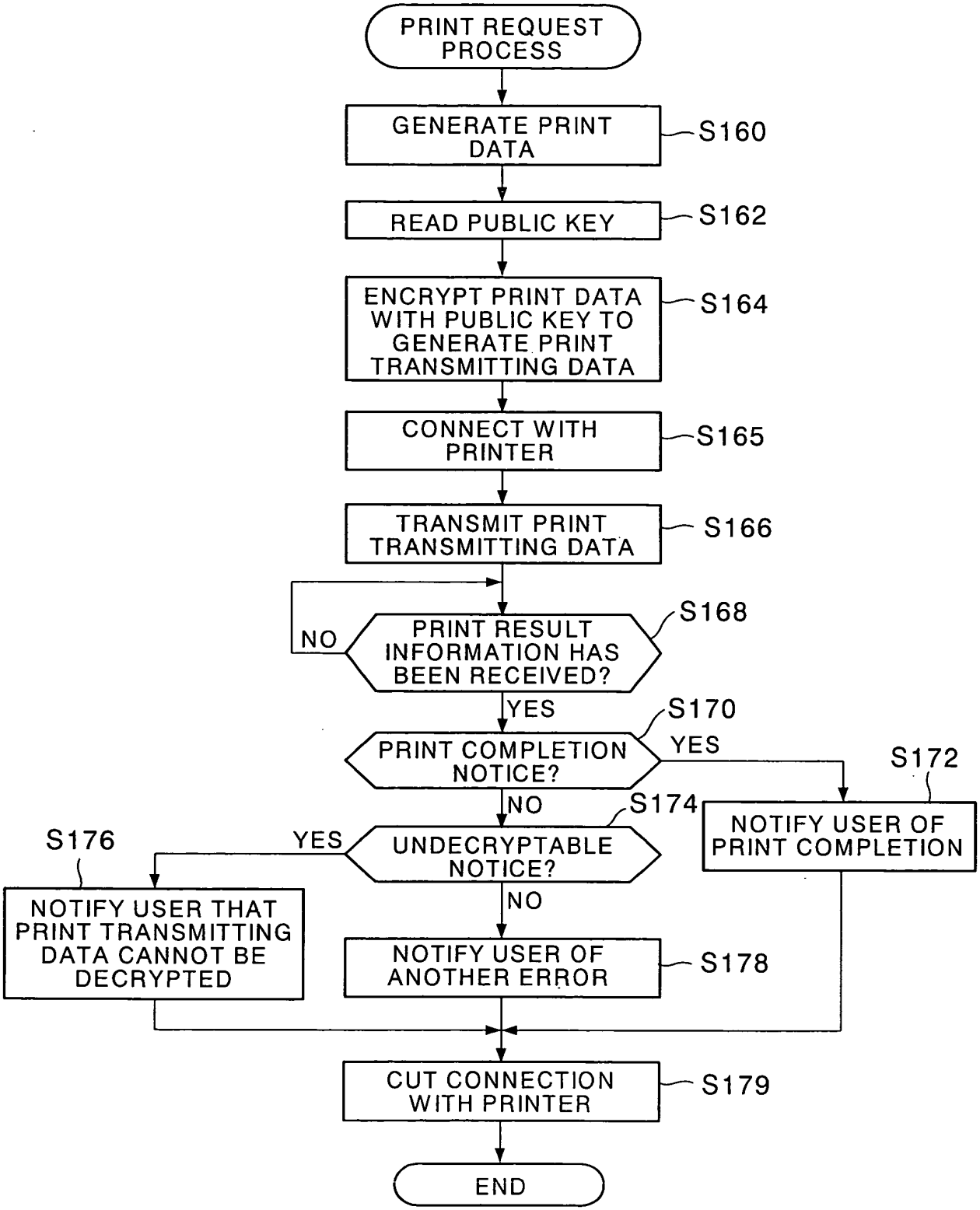
PRINT REQUEST PROCESS
GENERATE PRINT DATA
S160
READ PUBLIC KEY
S162
ENCRYPT PRINT DATA WITH PUBLIC KEY TO GENERATE PRINT TRANSMITTING DATA
S164
CONNECT WITH PRINTER
S165
TRANSMIT PRINT TRANSMITTING DATA
S166
NO
PRINT RESULT INFORMATION HAS BEEN RECEIVED?
S168
YES
PRINT COMPLETION NOTICE?
S170
YES
S172
NOTIFY USER OF PRINT COMPLETION
NO
UNDECRYPTABLE NOTICE?
S174
YES
S176
NOTIFY USER THAT PRINT TRANSMITTING DATA CANNOT BE DECRYPTED
NO
NOTIFY USER OF ANOTHER ERROR
S178
CUT CONNECTION WITH PRINTER
S179
END

FIG.10

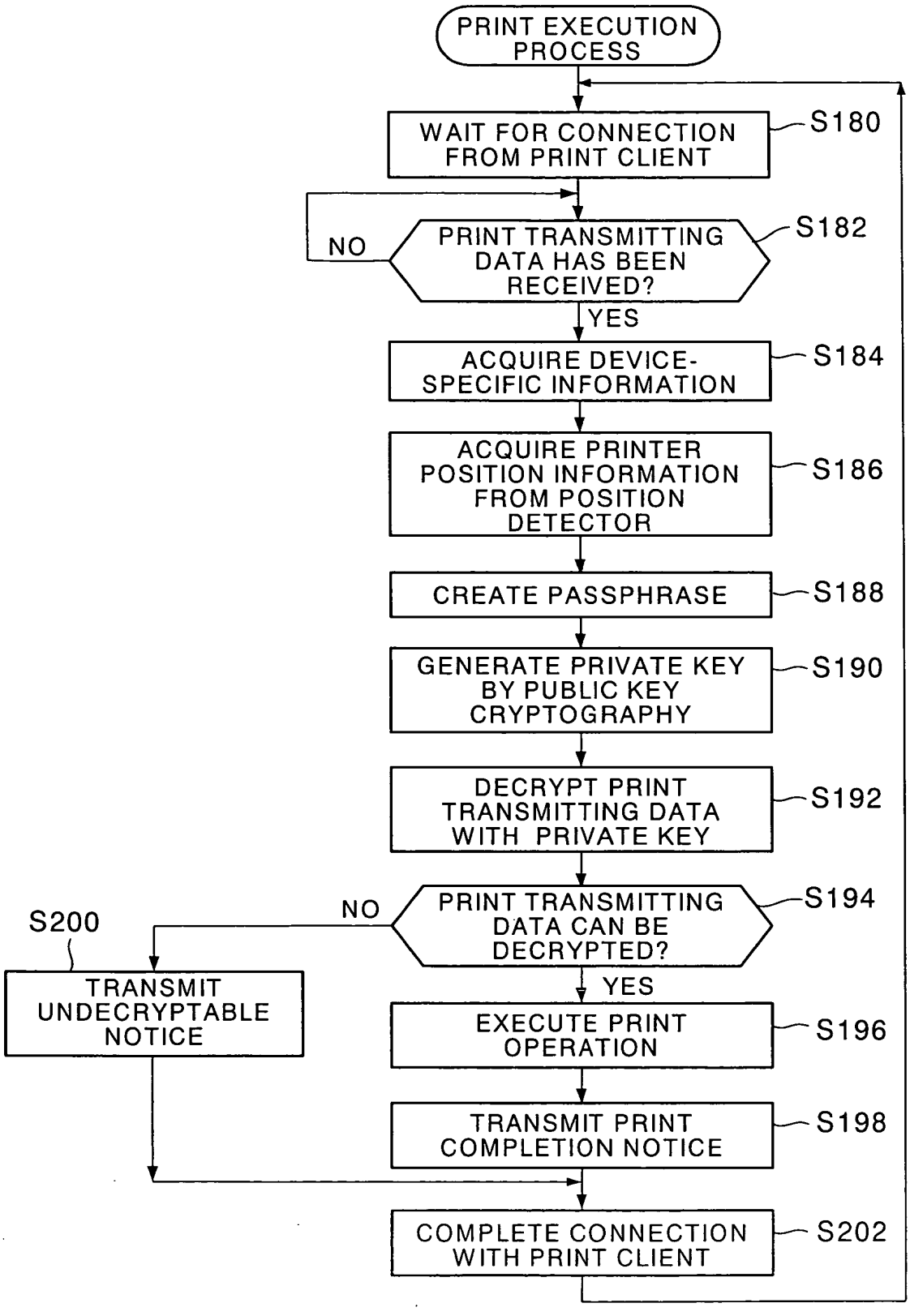
PRINT EXECUTION PROCESS
WAIT FOR CONNECTION FROM PRINT CLIENT
S180
NO
PRINT TRANSMITTING DATA HAS BEEN RECEIVED?
S182
YES
ACQUIRE DEVICE-SPECIFIC INFORMATION
S184
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S186
CREATE PASSPHRASE
S188
GENERATE PRIVATE KEY BY PUBLIC KEY CRYPTOGRAPHY
S190
DECRYPT PRINT TRANSMITTING DATA WITH PRIVATE KEY
S192
NO
PRINT TRANSMITTING DATA CAN BE DECRYPTED?
S194
S200
TRANSMIT UNDECRYPTABLE NOTICE
YES
EXECUTE PRINT OPERATION
S196
TRANSMIT PRINT COMPLETION NOTICE
S198
COMPLETE CONNECTION WITH PRINT CLIENT
S202

FIG.11A

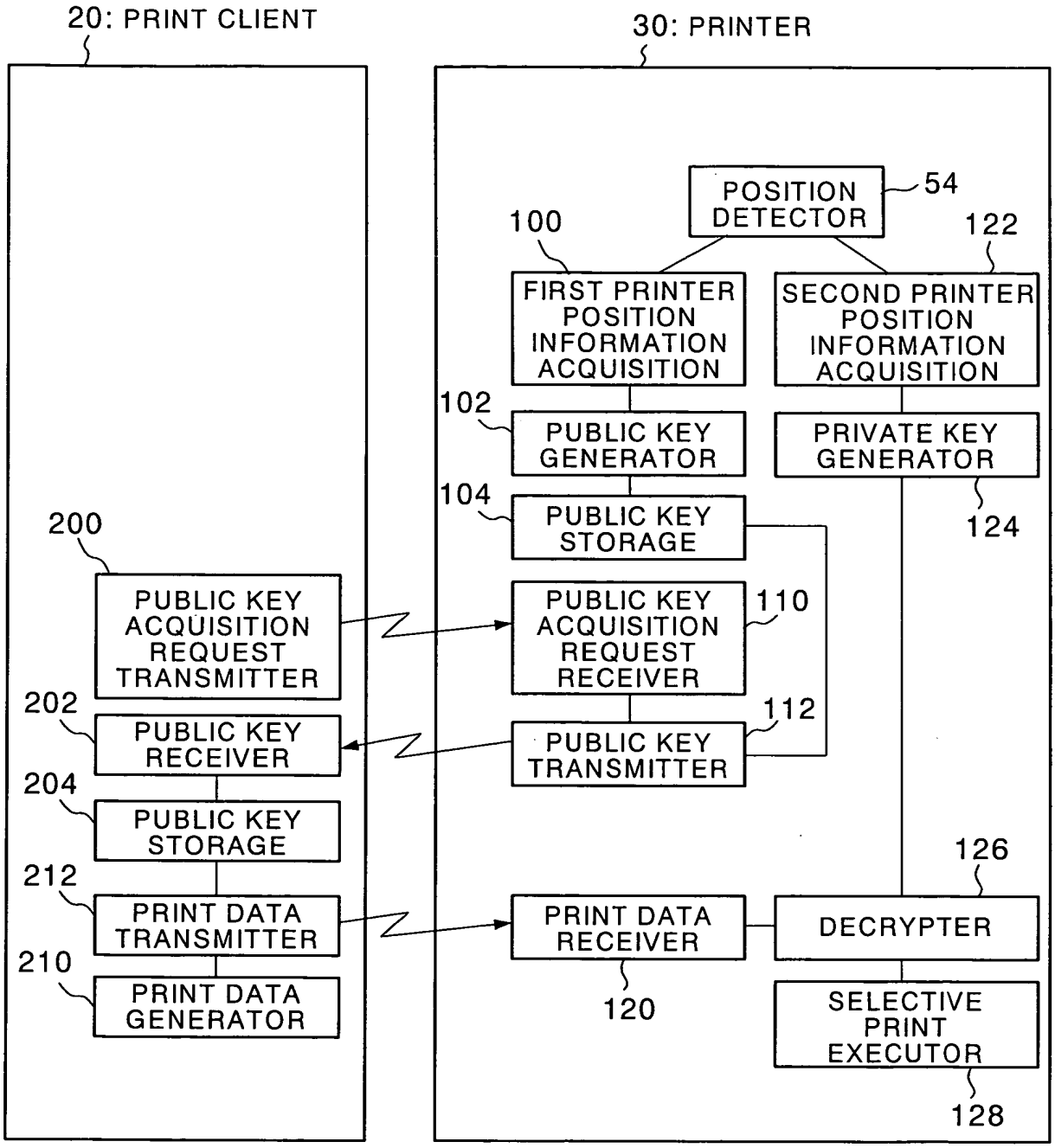
20: PRINT CLIENT
30: PRINTER
POSITION DETECTOR
54
100
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
SECOND PRINTER POSITION INFORMATION ACQUISITION
102
PUBLIC KEY GENERATOR
PRIVATE KEY GENERATOR
104
PUBLIC KEY STORAGE
124
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
PUBLIC KEY ACQUISITION REQUEST RECEIVER
110
202
PUBLIC KEY RECEIVER
112
PUBLIC KEY TRANSMITTER
204
PUBLIC KEY STORAGE
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
PRINT DATA GENERATOR
120
SELECTIVE PRINT EXECUTOR
128

FIG.11B

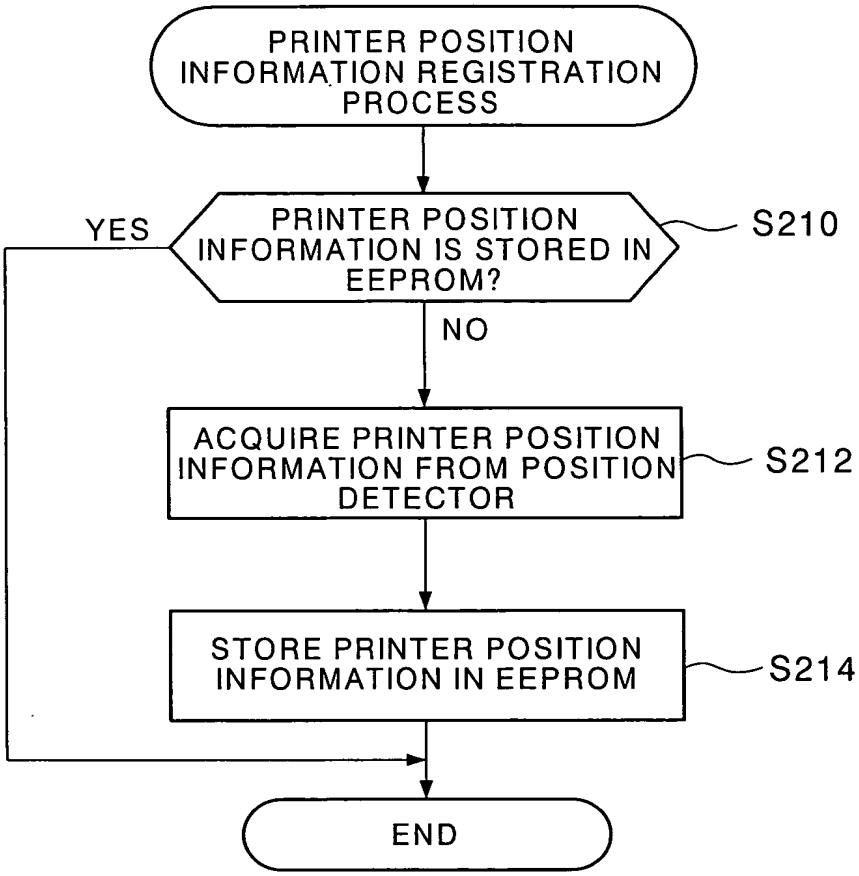
PRINTER POSITION INFORMATION REGISTRATION PROCESS
PRINTER POSITION INFORMATION IS STORED IN EEPROM?
S210
YES
NO
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S212
STORE PRINTER POSITION INFORMATION IN EEPROM
S214
END

FIG.12

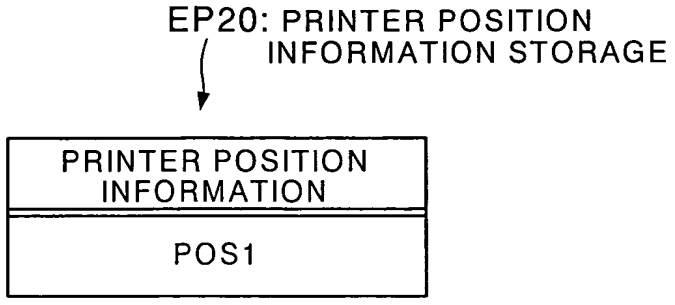
EP20: PRINTER POSITION INFORMATION STORAGE
PRINTER POSITION INFORMATION
POS1

FIG.13

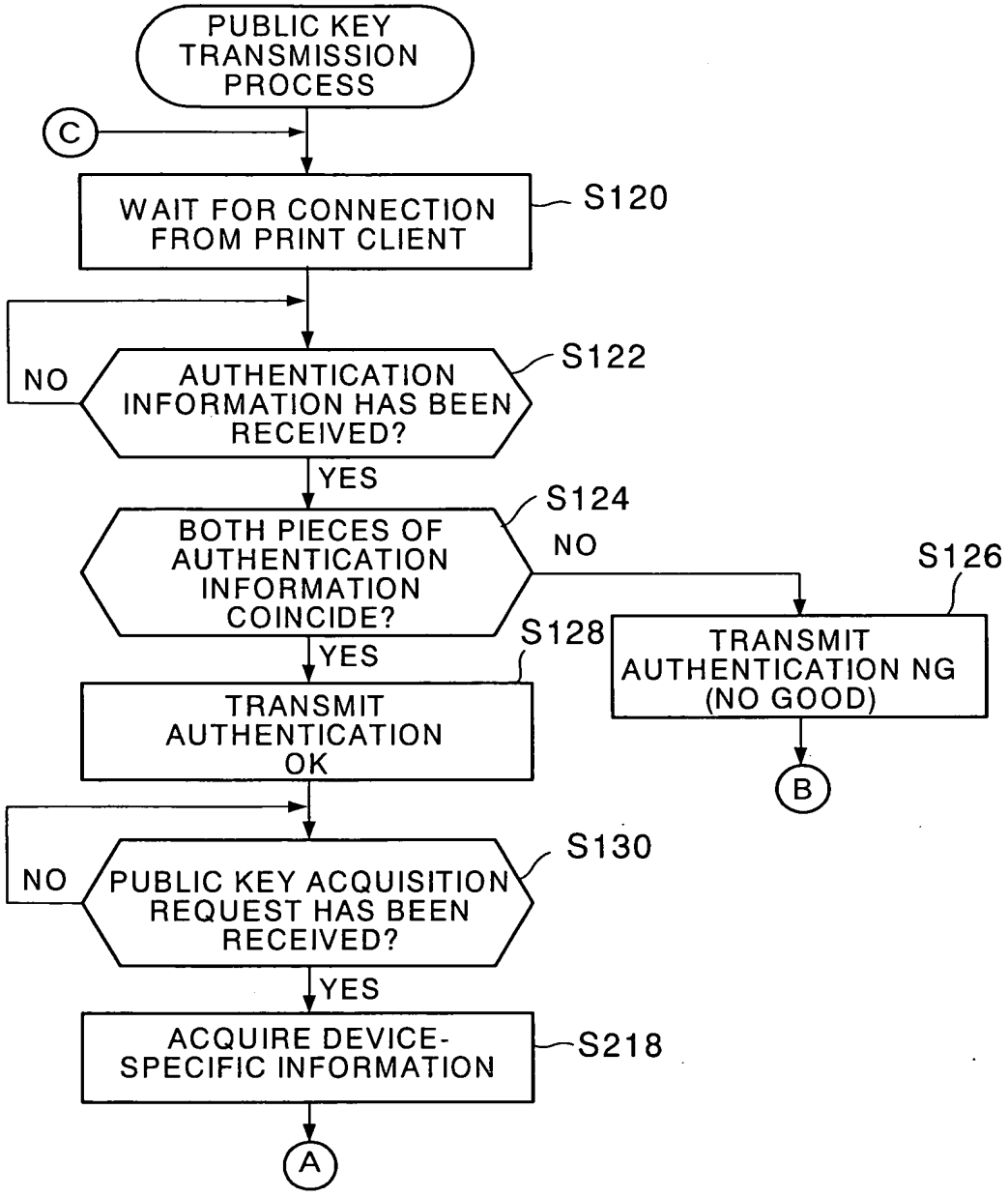
PUBLIC KEY TRANSMISSION PROCESS
C
WAIT FOR CONNECTION FROM PRINT CLIENT
S120
NO
AUTHENTICATION INFORMATION HAS BEEN RECEIVED?
S122
YES
BOTH PIECES OF AUTHENTICATION INFORMATION COINCIDE?
S124
NO
S126
TRANSMIT AUTHENTICATION NG (NO GOOD)
B
YES
S128
TRANSMIT AUTHENTICATION OK
NO
PUBLIC KEY ACQUISITION REQUEST HAS BEEN RECEIVED?
S130
YES
ACQUIRE DEVICE-SPECIFIC INFORMATION
S218
A

FIG.14

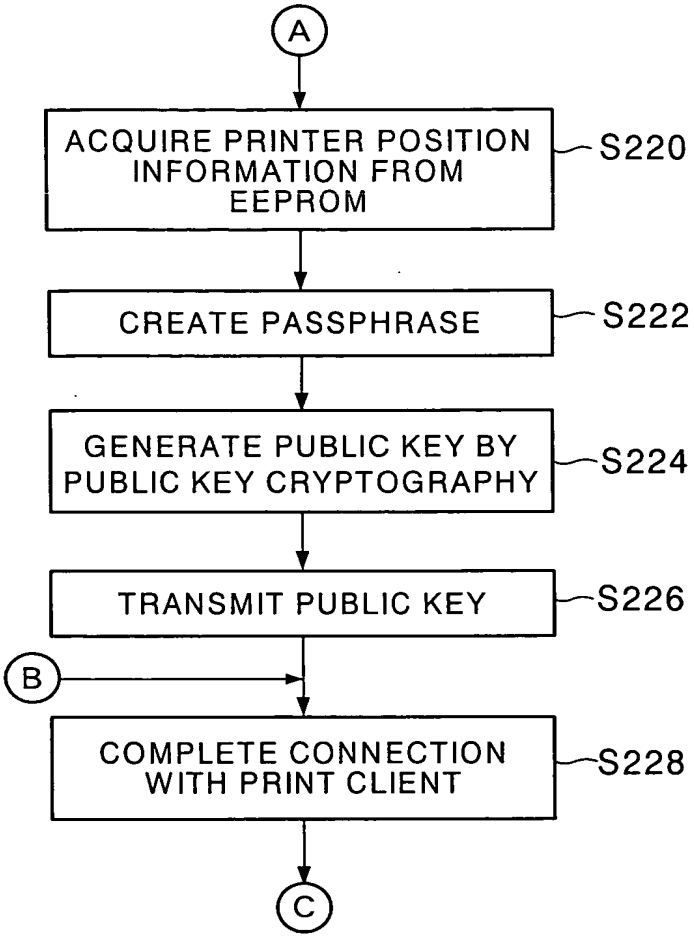
A
ACQUIRE PRINTER POSITION INFORMATION FROM EEPROM
S220
CREATE PASSPHRASE
S222
GENERATE PUBLIC KEY BY PUBLIC KEY CRYPTOGRAPHY
S224
TRANSMIT PUBLIC KEY
S226
B
COMPLETE CONNECTION WITH PRINT CLIENT
S228
C

FIG.15A

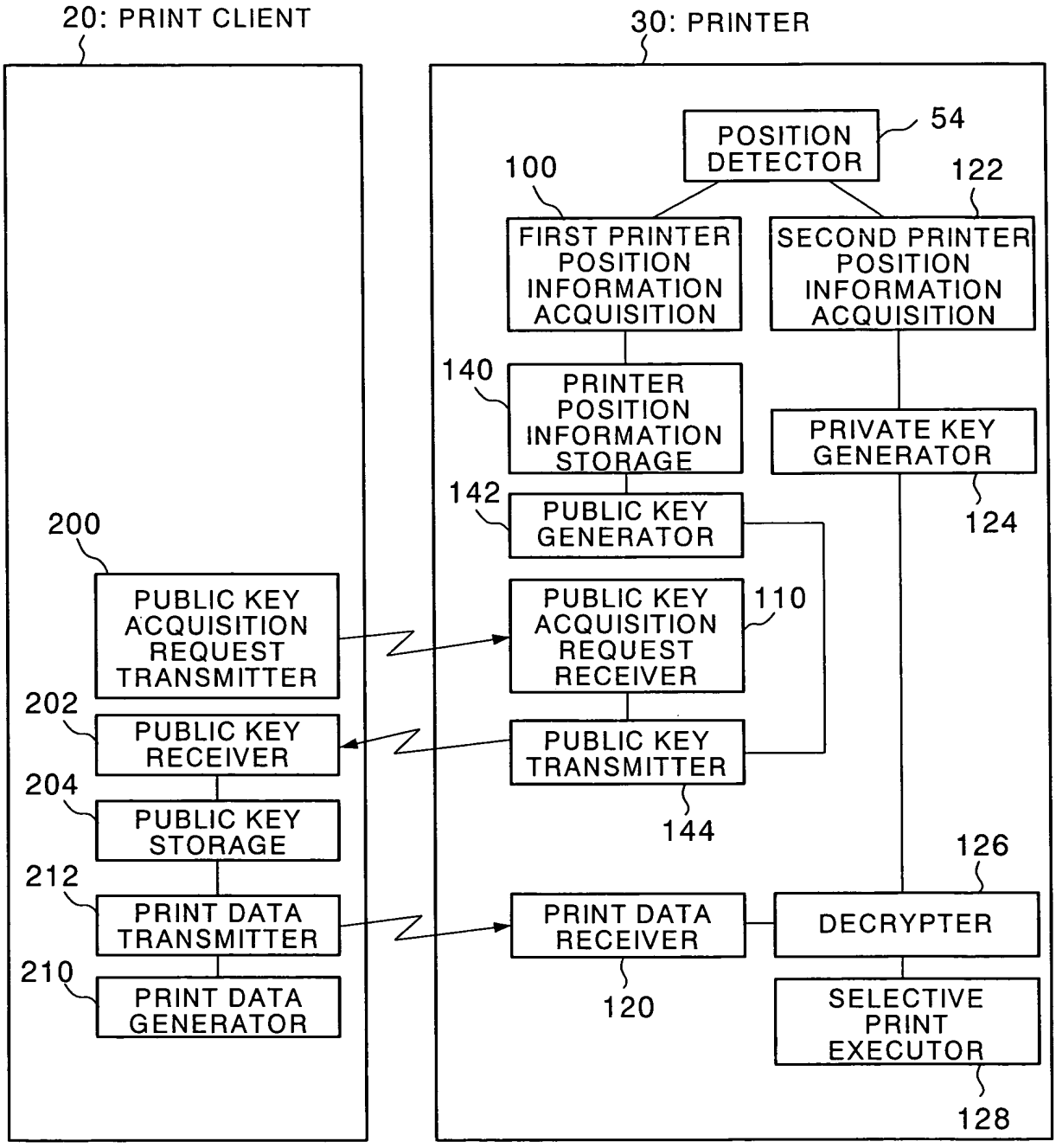
20: PRINT CLIENT
30: PRINTER
POSITION DETECTOR
54
100
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
SECOND PRINTER POSITION INFORMATION ACQUISITION
140
PRINTER POSITION INFORMATION STORAGE
PRIVATE KEY GENERATOR
142
PUBLIC KEY GENERATOR
124
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
PUBLIC KEY ACQUISITION REQUEST RECEIVER
110
202
PUBLIC KEY RECEIVER
PUBLIC KEY TRANSMITTER
204
144
PUBLIC KEY STORAGE
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
120
PRINT DATA GENERATOR
SELECTIVE PRINT EXECUTOR
128

FIG.15B

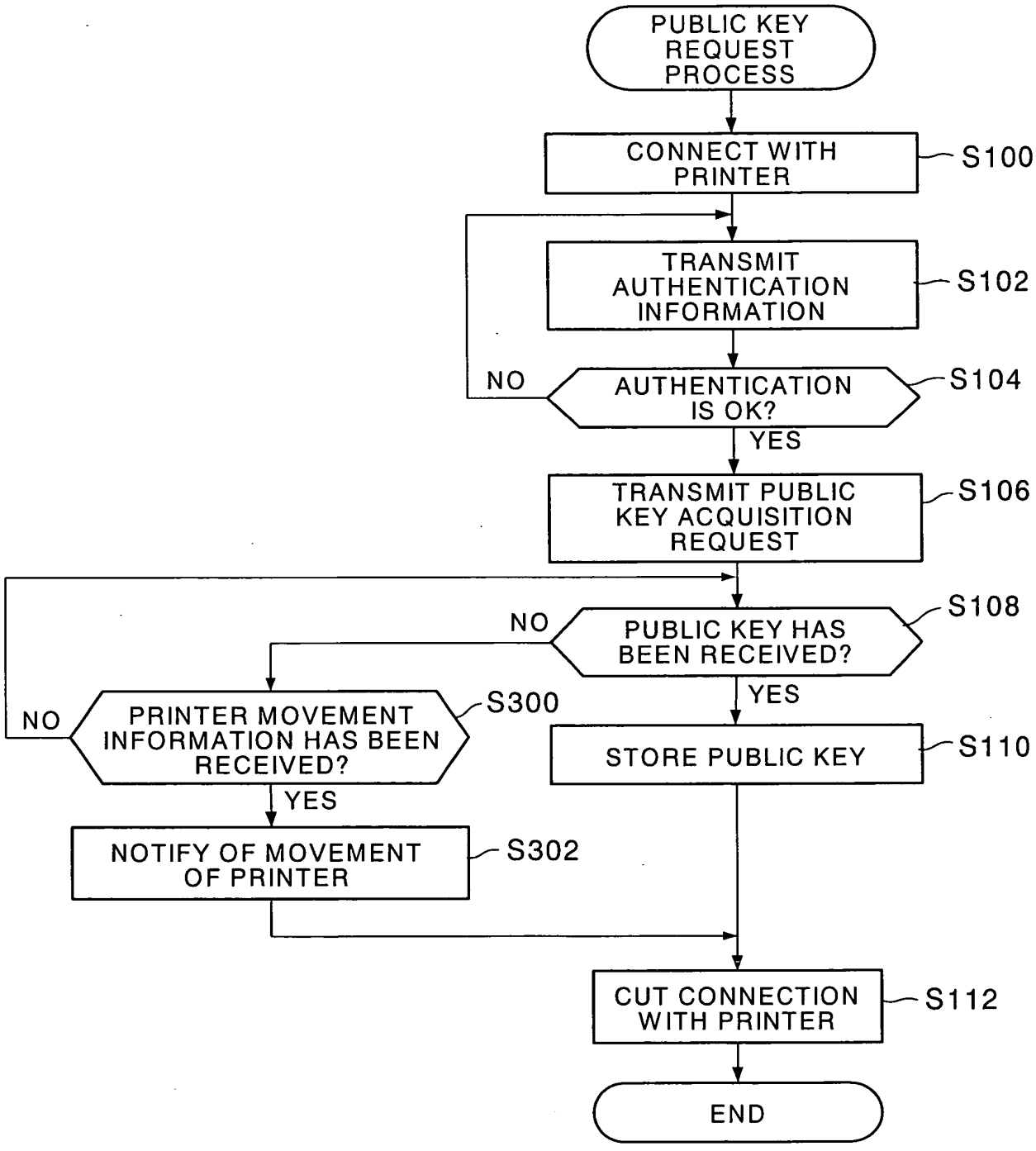
PUBLIC KEY REQUEST PROCESS
CONNECT WITH PRINTER
S100
TRANSMIT AUTHENTICATION INFORMATION
S102
NO
AUTHENTICATION IS OK?
S104
YES
TRANSMIT PUBLIC KEY ACQUISITION REQUEST
S106
NO
PUBLIC KEY HAS BEEN RECEIVED?
S108
YES
NO
PRINTER MOVEMENT INFORMATION HAS BEEN RECEIVED?
S300
YES
STORE PUBLIC KEY
S110
NOTIFY OF MOVEMENT OF PRINTER
S302
CUT CONNECTION WITH PRINTER
S112
END

FIG.16

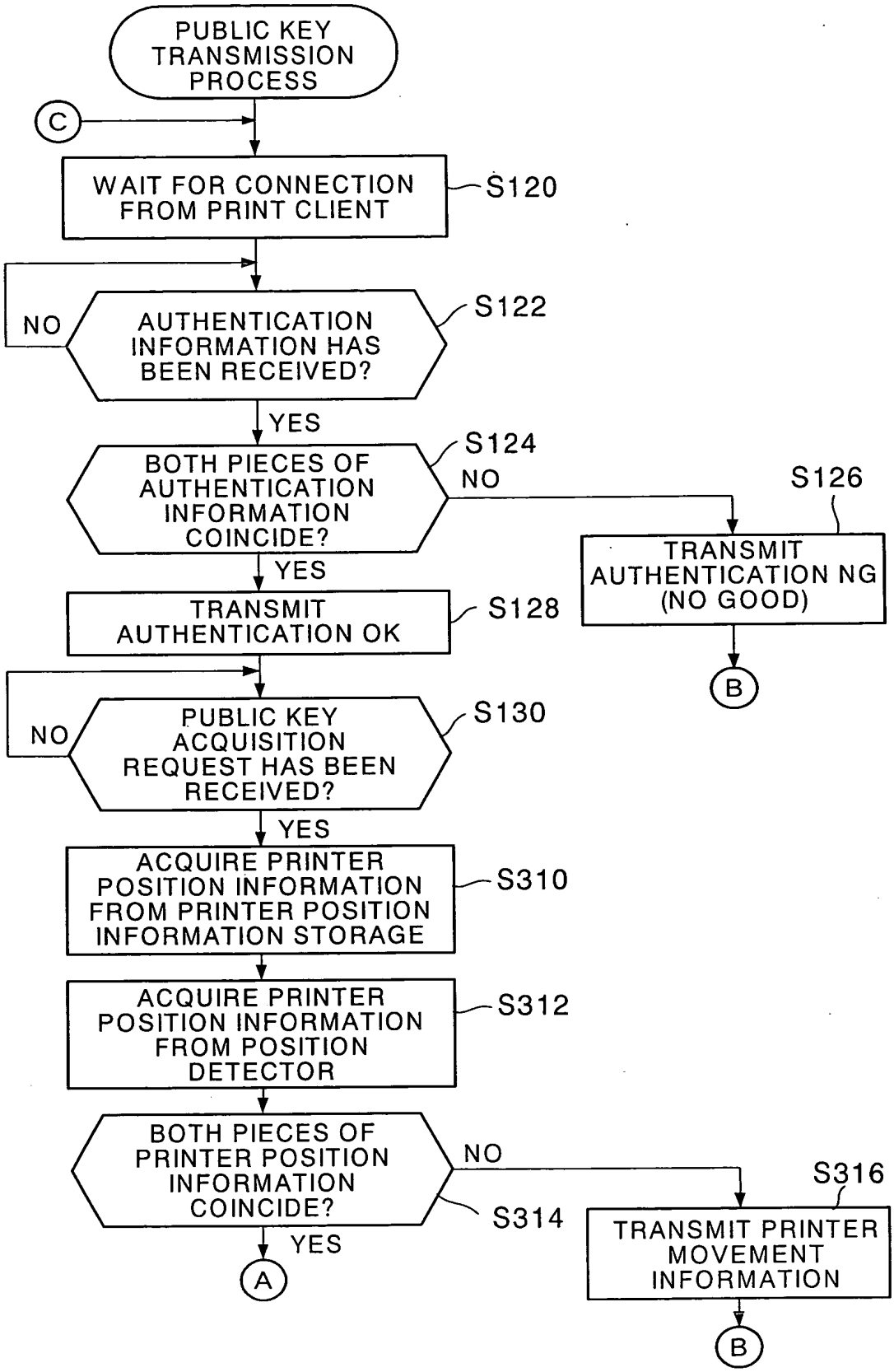
PUBLIC KEY TRANSMISSION PROCESS
C
WAIT FOR CONNECTION FROM PRINT CLIENT
S120
NO
AUTHENTICATION INFORMATION HAS BEEN RECEIVED?
S122
YES
BOTH PIECES OF AUTHENTICATION INFORMATION COINCIDE?
S124
NO
S126
TRANSMIT AUTHENTICATION NG (NO GOOD)
B
YES
TRANSMIT AUTHENTICATION OK
S128
NO
PUBLIC KEY ACQUISITION REQUEST HAS BEEN RECEIVED?
S130
YES
ACQUIRE PRINTER POSITION INFORMATION FROM PRINTER POSITION INFORMATION STORAGE
S310
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S312
BOTH PIECES OF PRINTER POSITION INFORMATION COINCIDE?
S314
NO
S316
TRANSMIT PRINTER MOVEMENT INFORMATION
B
YES
A

FIG.17

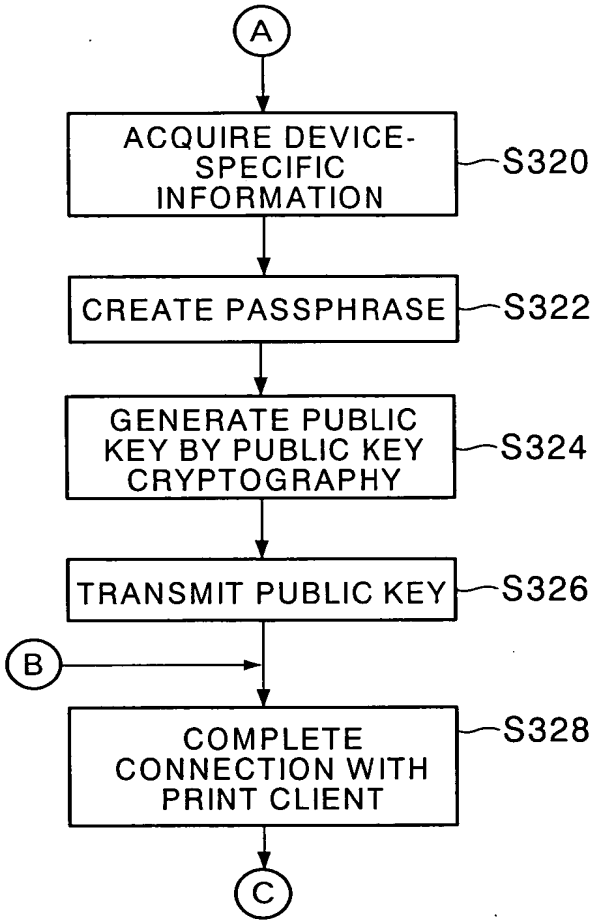
A
ACQUIRE DEVICE-SPECIFIC INFORMATION
S320
CREATE PASSPHRASE
S322
GENERATE PUBLIC KEY BY PUBLIC KEY CRYPTOGRAPHY
S324
TRANSMIT PUBLIC KEY
S326
B
COMPLETE CONNECTION WITH PRINT CLIENT
S328
C

FIG.18A

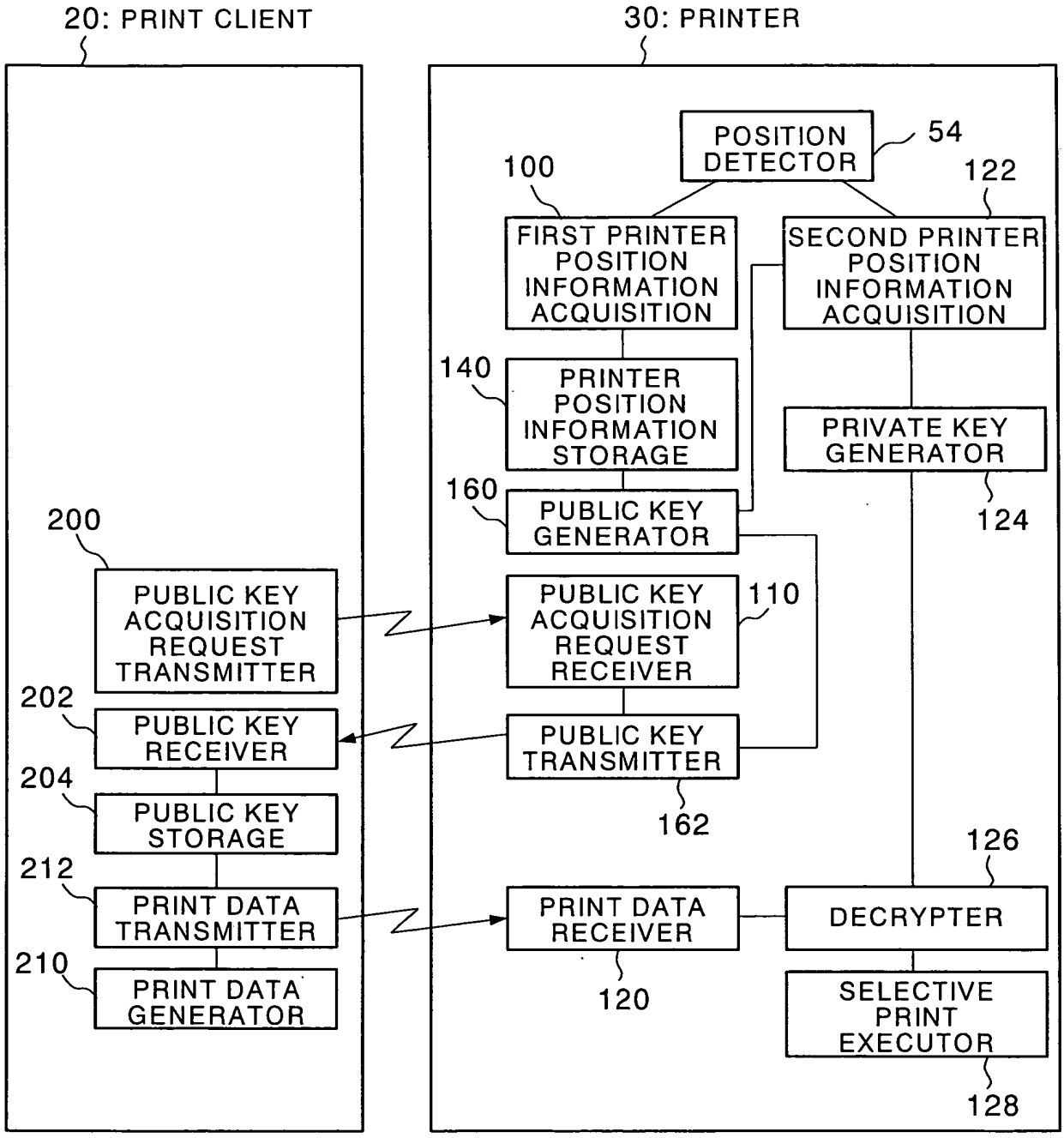
20: PRINT CLIENT
30: PRINTER
POSITION DETECTOR
54
100
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
SECOND PRINTER POSITION INFORMATION ACQUISITION
140
PRINTER POSITION INFORMATION STORAGE
PRIVATE KEY GENERATOR
160
PUBLIC KEY GENERATOR
124
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
PUBLIC KEY ACQUISITION REQUEST RECEIVER
110
202
PUBLIC KEY RECEIVER
PUBLIC KEY TRANSMITTER
204
PUBLIC KEY STORAGE
162
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
PRINT DATA GENERATOR
120
SELECTIVE PRINT EXECUTOR
128

FIG.18B

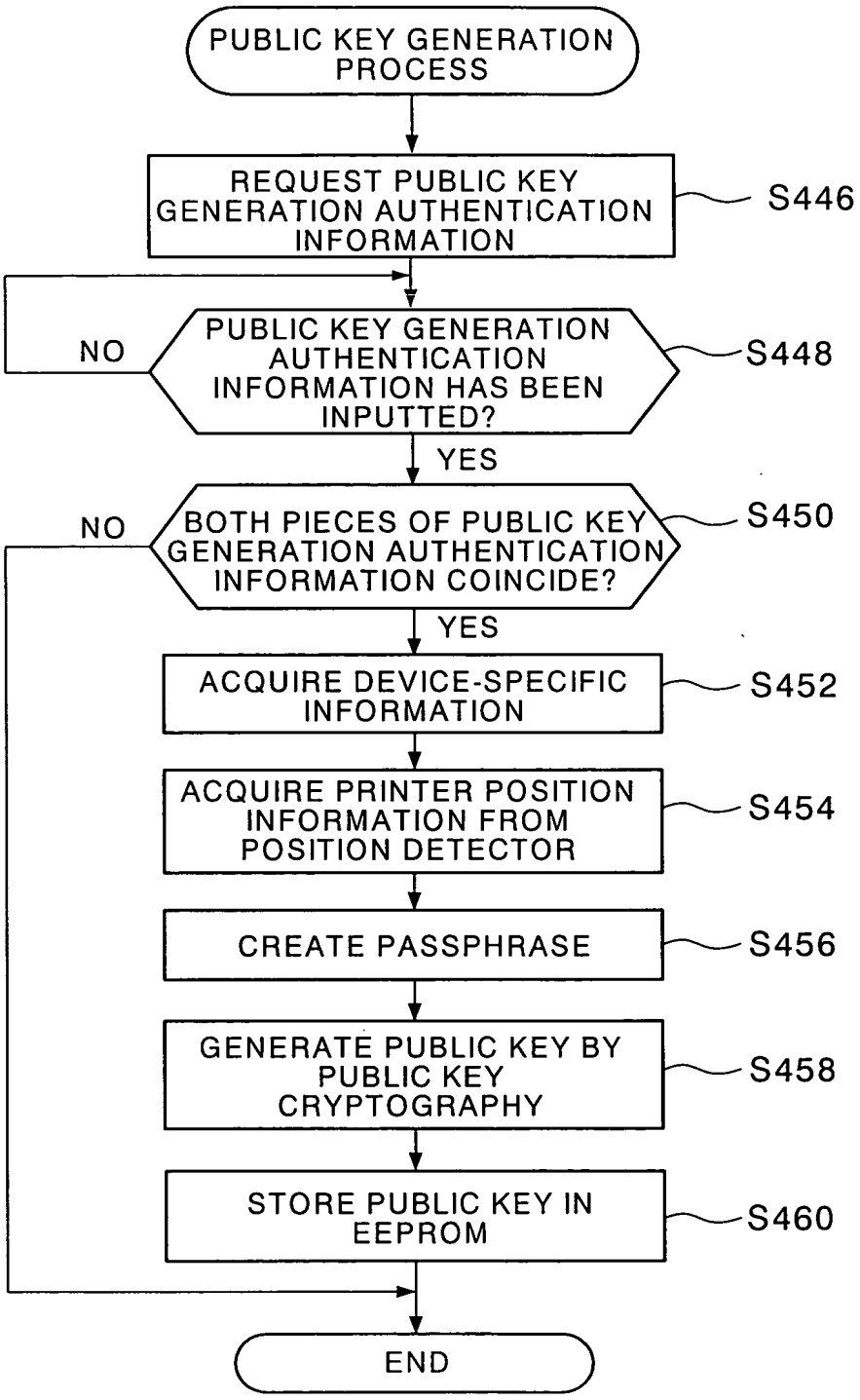
PUBLIC KEY GENERATION PROCESS
REQUEST PUBLIC KEY GENERATION AUTHENTICATION INFORMATION
S446
NO
PUBLIC KEY GENERATION AUTHENTICATION INFORMATION HAS BEEN INPUTTED?
S448
YES
NO
BOTH PIECES OF PUBLIC KEY GENERATION AUTHENTICATION INFORMATION COINCIDE?
S450
YES
ACQUIRE DEVICE-SPECIFIC INFORMATION
S452
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S454
CREATE PASSPHRASE
S456
GENERATE PUBLIC KEY BY PUBLIC KEY CRYPTOGRAPHY
S458
STORE PUBLIC KEY IN EEPROM
S460
END

FIG.19A

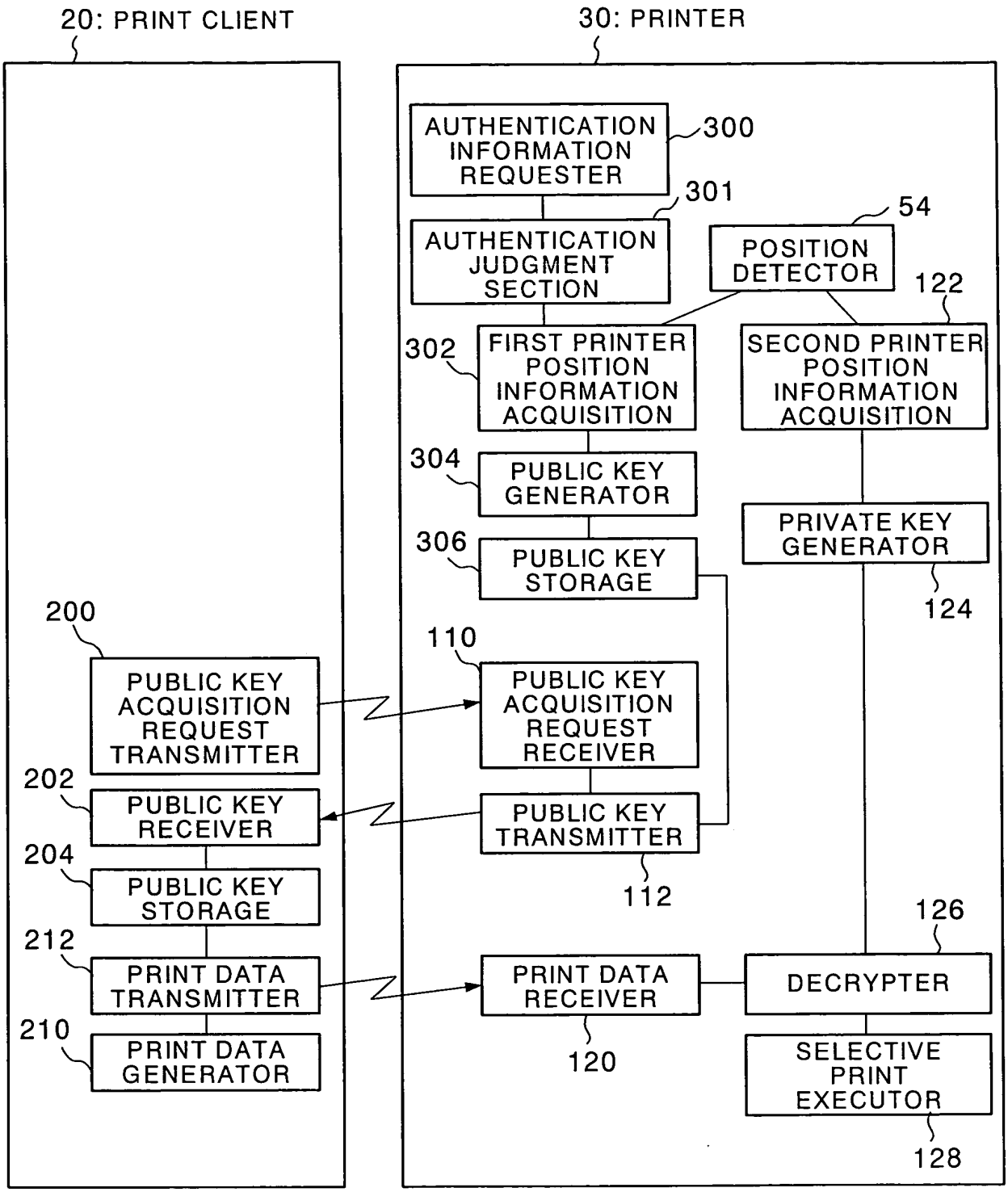
20: PRINT CLIENT
30: PRINTER
AUTHENTICATION INFORMATION REQUESTER
300
AUTHENTICATION JUDGMENT SECTION
301
POSITION DETECTOR
54
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
302
SECOND PRINTER POSITION INFORMATION ACQUISITION
PUBLIC KEY GENERATOR
304
PRIVATE KEY GENERATOR
124
PUBLIC KEY STORAGE
306
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
110
PUBLIC KEY ACQUISITION REQUEST RECEIVER
202
PUBLIC KEY RECEIVER
PUBLIC KEY TRANSMITTER
112
204
PUBLIC KEY STORAGE
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
PRINT DATA GENERATOR
120
SELECTIVE PRINT EXECUTOR
128

FIG.19B

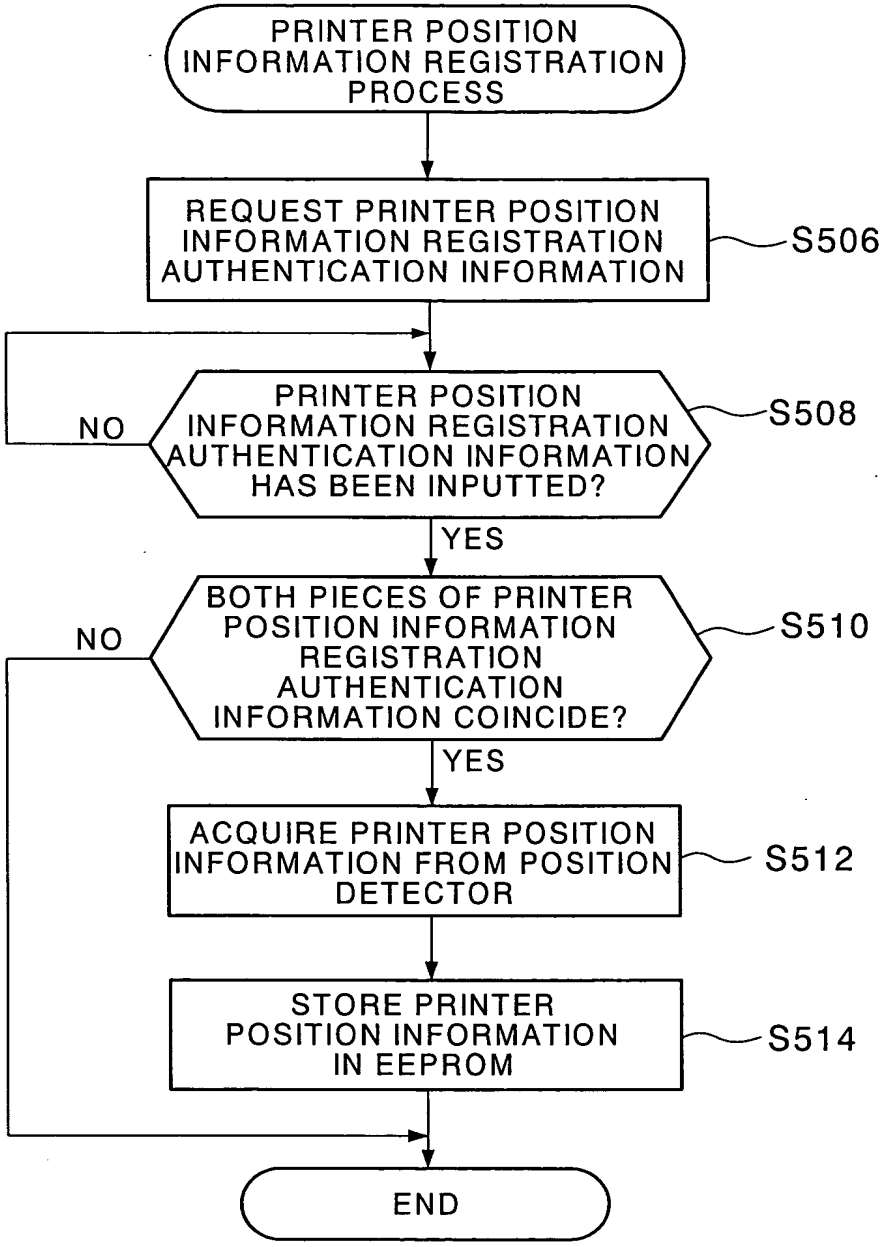
PRINTER POSITION INFORMATION REGISTRATION PROCESS
REQUEST PRINTER POSITION INFORMATION REGISTRATION AUTHENTICATION INFORMATION
S506
PRINTER POSITION INFORMATION REGISTRATION AUTHENTICATION INFORMATION HAS BEEN INPUTTED?
S508
NO
YES
BOTH PIECES OF PRINTER POSITION INFORMATION REGISTRATION AUTHENTICATION INFORMATION COINCIDE?
S510
NO
YES
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S512
STORE PRINTER POSITION INFORMATION IN EEPROM
S514
END

FIG.20A

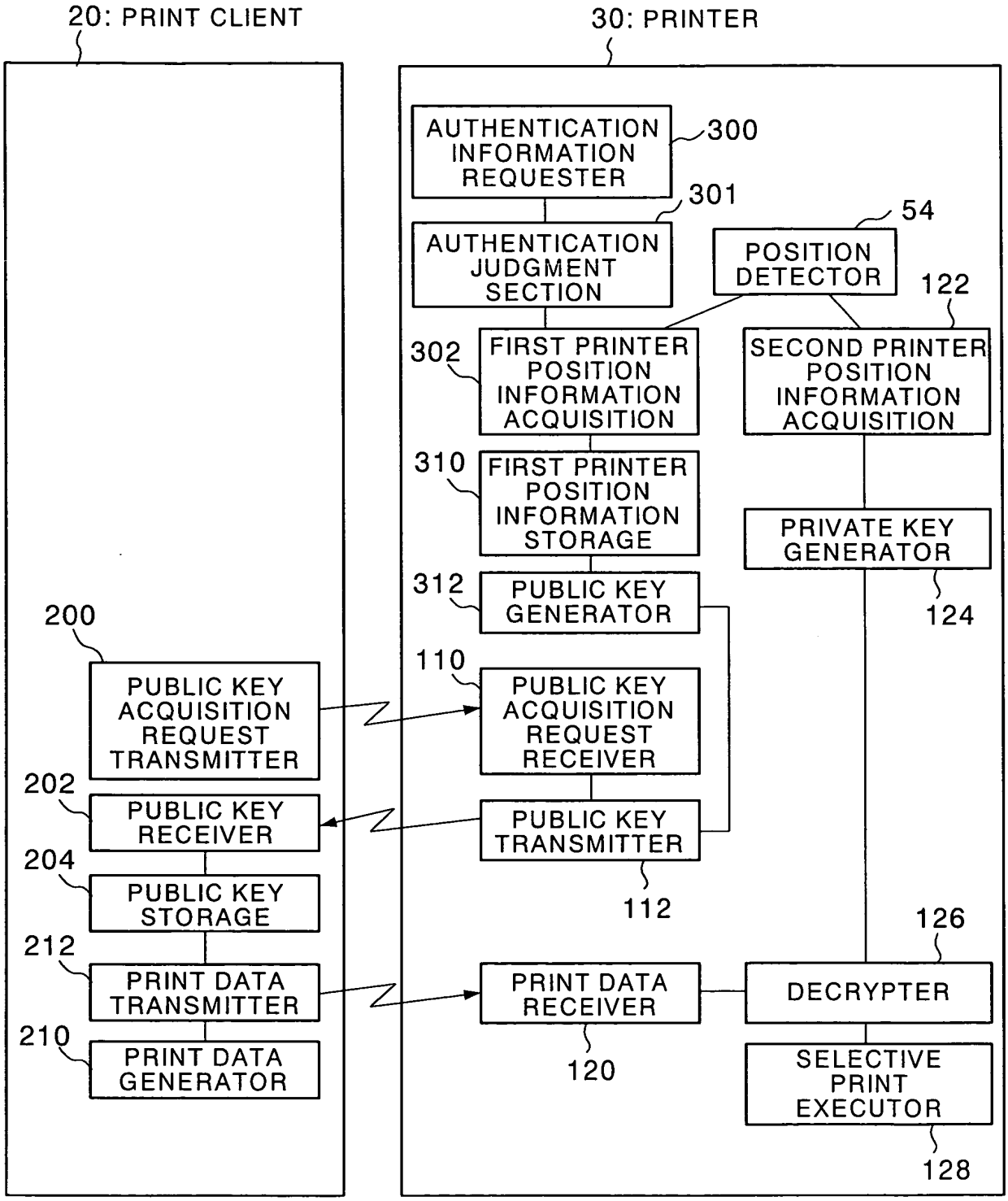
20: PRINT CLIENT
30: PRINTER
AUTHENTICATION INFORMATION REQUESTER
300
AUTHENTICATION JUDGMENT SECTION
301
POSITION DETECTOR
54
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
302
SECOND PRINTER POSITION INFORMATION ACQUISITION
FIRST PRINTER POSITION INFORMATION STORAGE
310
PRIVATE KEY GENERATOR
PUBLIC KEY GENERATOR
312
124
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
110
PUBLIC KEY ACQUISITION REQUEST RECEIVER
202
PUBLIC KEY RECEIVER
PUBLIC KEY TRANSMITTER
204
PUBLIC KEY STORAGE
112
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
PRINT DATA GENERATOR
120
SELECTIVE PRINT EXECUTOR
128

FIG.20B

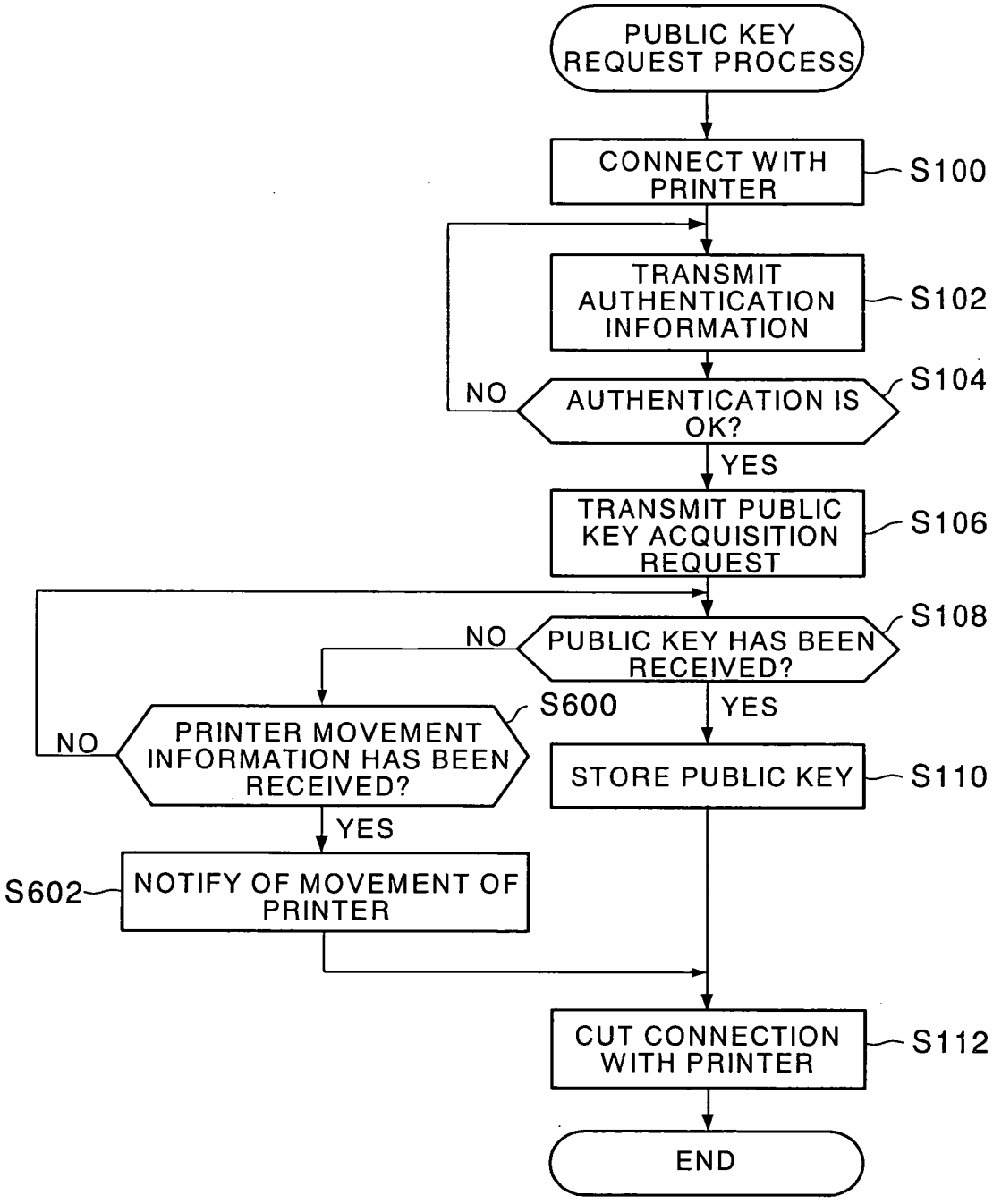
PUBLIC KEY REQUEST PROCESS
CONNECT WITH PRINTER
S100
TRANSMIT AUTHENTICATION INFORMATION
S102
NO
AUTHENTICATION IS OK?
S104
YES
TRANSMIT PUBLIC KEY ACQUISITION REQUEST
S106
NO
PUBLIC KEY HAS BEEN RECEIVED?
S108
YES
S600
NO
PRINTER MOVEMENT INFORMATION HAS BEEN RECEIVED?
STORE PUBLIC KEY
S110
YES
S602
NOTIFY OF MOVEMENT OF PRINTER
CUT CONNECTION WITH PRINTER
S112
END

FIG.21

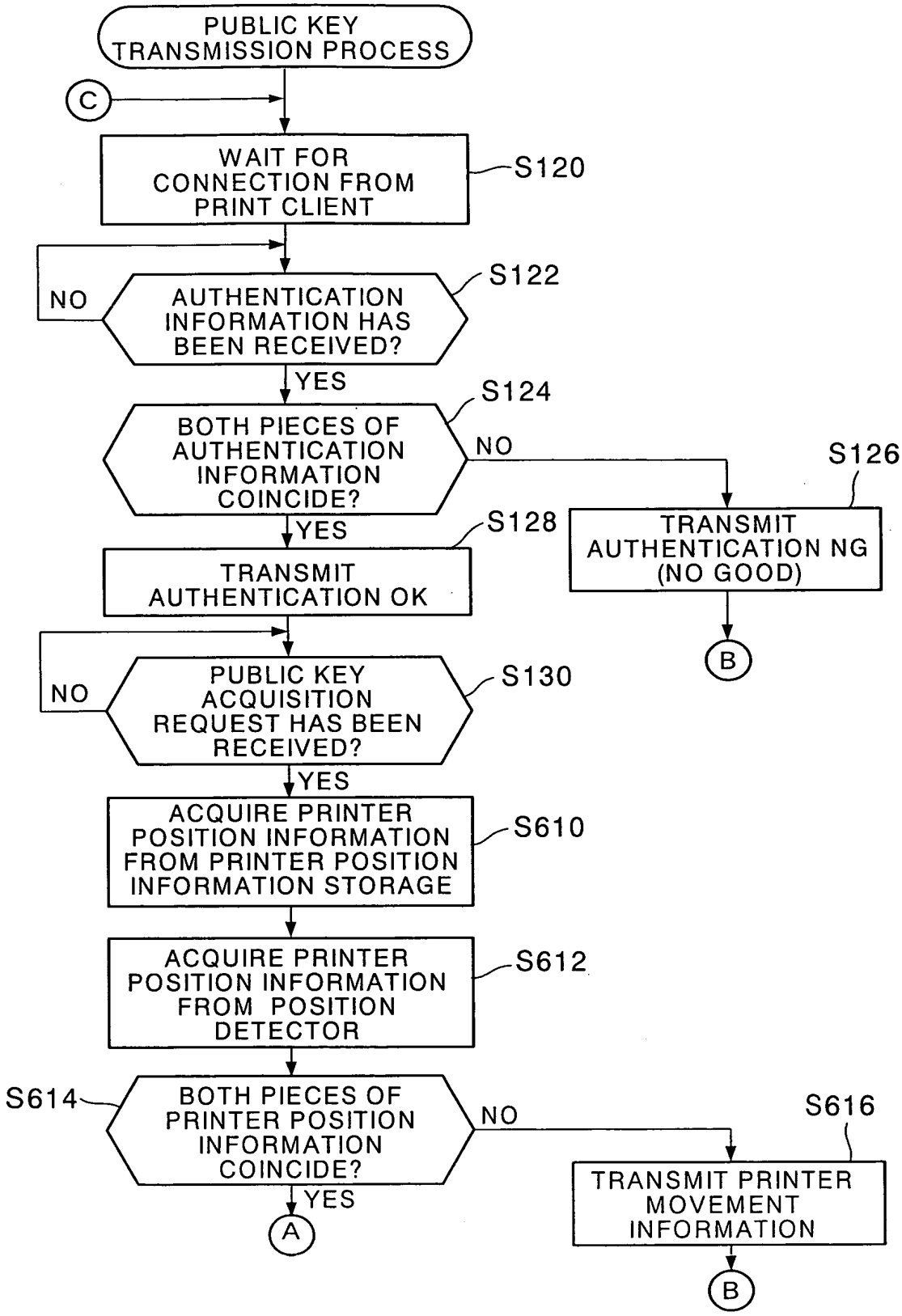
PUBLIC KEY TRANSMISSION PROCESS
C
WAIT FOR CONNECTION FROM PRINT CLIENT
S120
NO
AUTHENTICATION INFORMATION HAS BEEN RECEIVED?
S122
YES
BOTH PIECES OF AUTHENTICATION INFORMATION COINCIDE?
S124
NO
S126
TRANSMIT AUTHENTICATION NG (NO GOOD)
B
YES
TRANSMIT AUTHENTICATION OK
S128
NO
PUBLIC KEY ACQUISITION REQUEST HAS BEEN RECEIVED?
S130
YES
ACQUIRE PRINTER POSITION INFORMATION FROM PRINTER POSITION INFORMATION STORAGE
S610
ACQUIRE PRINTER POSITION INFORMATION FROM POSITION DETECTOR
S612
S614
BOTH PIECES OF PRINTER POSITION INFORMATION COINCIDE?
NO
S616
TRANSMIT PRINTER MOVEMENT INFORMATION
B
YES
A

FIG.22

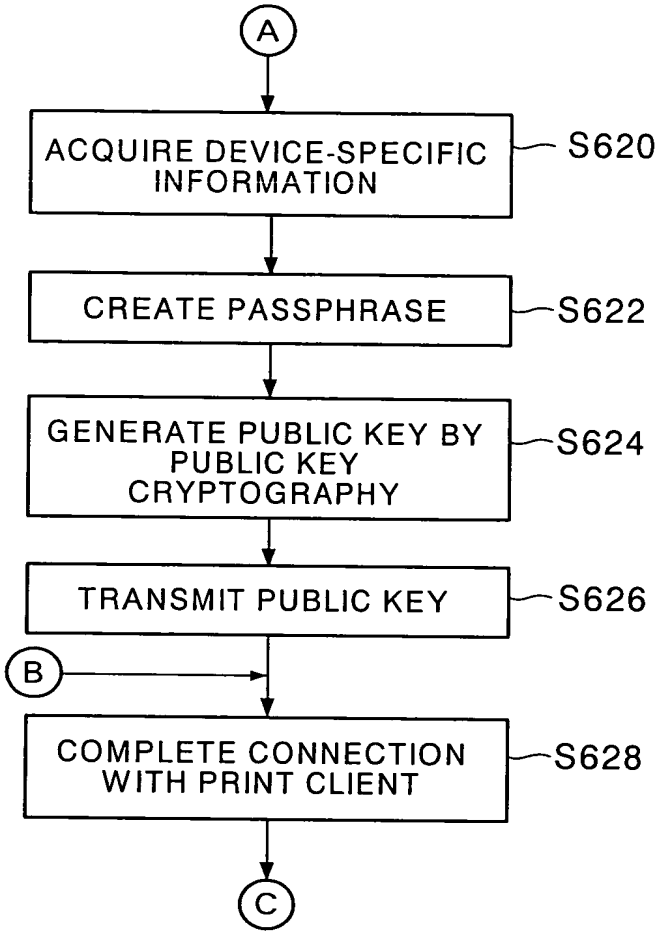
A
ACQUIRE DEVICE-SPECIFIC INFORMATION
S620
CREATE PASSPHRASE
S622
GENERATE PUBLIC KEY BY PUBLIC KEY CRYPTOGRAPHY
S624
TRANSMIT PUBLIC KEY
S626
B
COMPLETE CONNECTION WITH PRINT CLIENT
S628
C

FIG.23

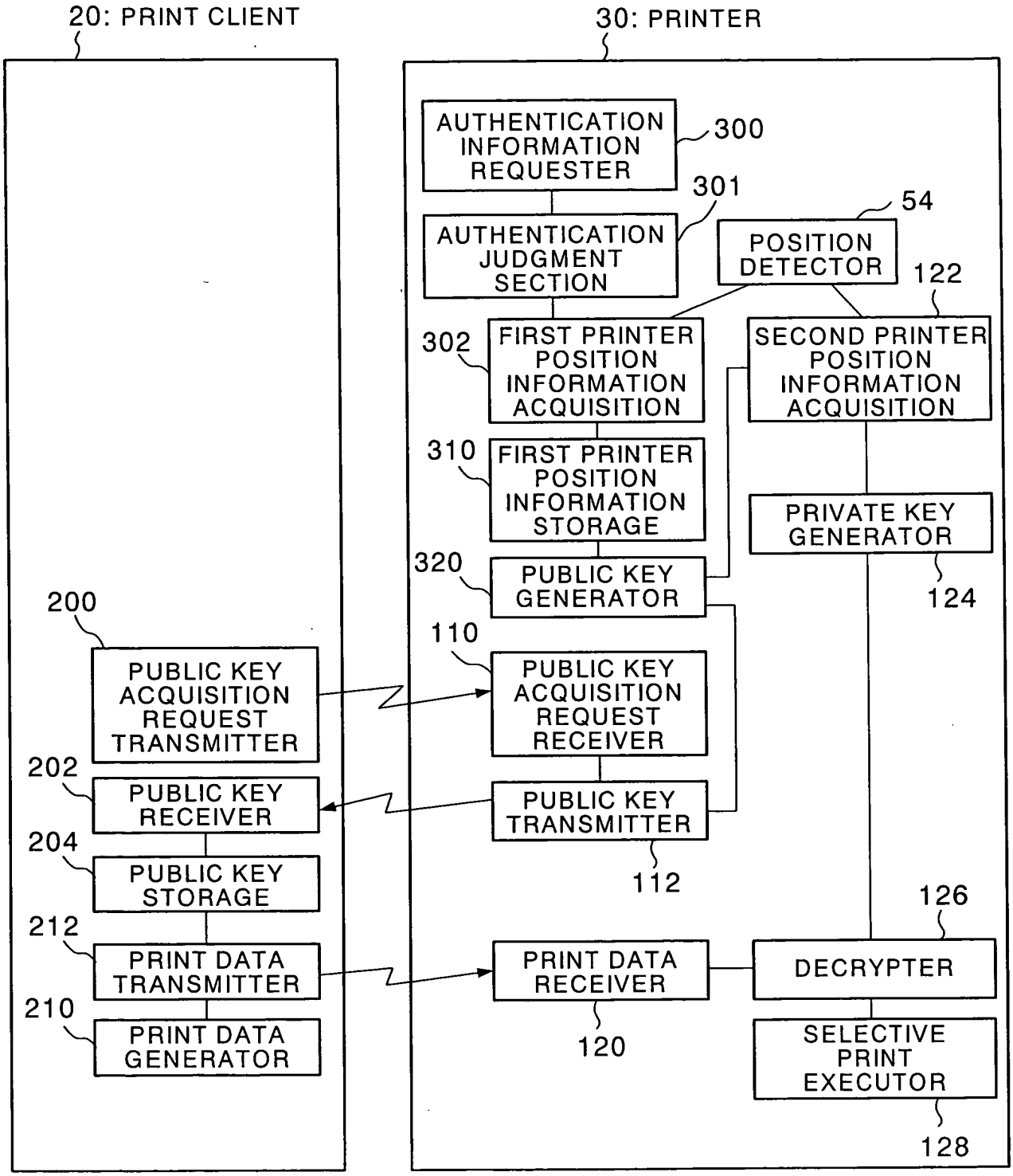
20: PRINT CLIENT
30: PRINTER
AUTHENTICATION INFORMATION REQUESTER
300
AUTHENTICATION JUDGMENT SECTION
301
POSITION DETECTOR
54
122
FIRST PRINTER POSITION INFORMATION ACQUISITION
302
SECOND PRINTER POSITION INFORMATION ACQUISITION
FIRST PRINTER POSITION INFORMATION STORAGE
310
PRIVATE KEY GENERATOR
124
PUBLIC KEY GENERATOR
320
200
PUBLIC KEY ACQUISITION REQUEST TRANSMITTER
110
PUBLIC KEY ACQUISITION REQUEST RECEIVER
202
PUBLIC KEY RECEIVER
PUBLIC KEY TRANSMITTER
112
204
PUBLIC KEY STORAGE
126
212
PRINT DATA TRANSMITTER
PRINT DATA RECEIVER
DECRYPTER
210
PRINT DATA GENERATOR
120
SELECTIVE PRINT EXECUTOR
128

FIG.24